



All major operators view 10 Gigabit Ethernet (10GigE) as the key enabling technology in today's market and are implementing it in their networks as LAN, WAN, or in combination with OTN.

The major challenge of manufacturers is to provide interface cards with capabilities for multiple technologies. They need to verify the ports against various standards, such as IEEE and ITU-T, to ensure that all of the network layers are interacting properly. As Ethernet behavior changes from "best effort" to "carrier grade", comprehensive testing is required.



The Module-E 10G for JDSU's ONT-503/506/512 addresses the needs of R&D and SVT labs by providing all of the necessary functionality for testing layers 1 up to 3 of 10GigE LAN and WAN networks optical at different wavelengths and with electrical interfaces. For these applications Module-E provides all necessary technologies LAN, WAN, FC, SONET/SDH, OTN and has stressed eye and jitter on its roadmap.



Introducing **Module-E 10G** within ONT-503/506/512

R&D and Compliance Testing

- Built-in switchable and XFP optics and high output electrical interface
- Unframed BERT at 9.95, 10.0, 10.3, 10.5, 10.66, 10.7, 11.05, 11.1, 11.27, 11.32 Gb/s
- SONET/SDH framed signals with HO mappings
- SONET/SDH MultiChannel (192xSTS-1, 64xAU-3/-4)
- OTN at 10.7, 11.05, 11.1, 11.27, 11.32 Gb/s with FEC stress testing
- ONT Wrapper/de-wrapper testing
- 10GigE LAN/WAN BERT and L2/L3 traffic
- 10G Fiber Channel BERT
- 256 MAC/IP Flows with 256 independent filters
- 10 mixed VLAN / MPLS tags
- Enhanced Ethernet frames VPLS, MAC-in-MAC
- QoS, service disruption, packet jitter, BERT per flow
- Stressed eye testing
- Jitter/wander testing



Applications

10GigE LAN, 10G FC Testing

- 10GigE LAN BERT with A/-B seed
- 10G FC BERT with A/-B-seed
- 10GigE LAN with MAC/IP traffic
- Sophisticated PCS layer testing with dynamic block errors, coding statistics and block capture
- 256 MAC/IP Flows with 256 independent filters
- 10 mixed VLAN / MPLS tags
- Enhanced Ethernet Frames VPLS, MAC-in-MAC
- QoS, service disruption, packet jitter, BERT per flow
- Tree different types of packet jitter: Instantaneous, RFC3550 and absolute
- Online hitless traffic control
- IPv4/IPv6 and packet capture

10GigE WAN, 10G SONET/SDH Testing

- OC-192c/STM-64c BERT and WAN
- Full 10GigE functionality in WAN as per 10GigE LAN
- Dynamic error/alarm insertion including pulse bursts
- Best-in-class service disruption with high level of details
- All pointer sequences
- Performance monitoring G.826/828/829
- Byte capture all SOH/TOH bytes

Multi-Channel 10G High Order

- Generation and analysis of up to 192xSTS-1/64xAU-3/4
- Analysis of BER, service disruption, errors, alarms in all channels
- Mixed mappings
- STS-1 /3c/6c/9c/12c/24c/48c/192c
- VC-4-2c/3c/4c/8c/16c/64c

- Enhanced through mode with error and alarm injection in multiple channels
- Dynamic error/alarm insertion including pulse bursts
- Best-in-class service disruption with high level of details
- Byte capture all SOH/TOH bytes

OTN OTU2 10/11G Testing

- Standard and overclocked OTU2 line rates
- OTN wrapper/dewrapper testing (RX <> TX rates)
- Support of all TCM layers
- Transfer delay and service disruption
- Unique FEC stress testing with walking pattern
- OH byte capture
- Dynamic error/alarm insertion including pulse bursts

Stressed Eye and Jitter/Wander Testing

(in preparation)

- Stressed eye (SE) generation at all unframed and framed rates at 1550 nm
- User-adjustable OMA, ER, SJ, and VECP
- Stressed receiver sensitivity (SRS) test with pass/fail result using bit error ratio (BER) measurement
- Jitter/wander generation and analysis for all line rates
- Framed and unframed signals with optical and differential electrical interfaces
- TDEV noise wander generation for all interfaces incl. DS1/E1
- Automatic measurements MTJ, FMTJ, JTF, MTW, WTF
- Online TIE/MTIE/TDEV wander measurements

Multiple Applications for Multiple Users

Combining broadest range of technologies with real multi-user capabilities the JDSU ONT-503/506/512 is the lab tool enabling users to get the most out of their testing time.

Highly developed Tcl- and C-libraries together with LW CVI drivers facilitate and speed the development of automated test scripts

40/43G with Jitter

For analyzing electrical and optical 40/43 Gb/s SDH/SONET/OTU-3 systems including jitter and wander functionality in one unit.

High Accurate Jitter up to 10.7 Gb/s

For qualifying electrical and optical inputs and outputs of systems 155M up to 10.7 Gb/s. The jitter receiver provides the highest accuracy on the market. The solution complies to ITU-T O.172 Appendix VII and VIII. Wander measurements are processes with up to 1000 samples/s.

OTN all rates

For system testing with all G.709 mappings OTU-1/2/3 and overclocked OTU-2. Various clients are supported together with the wrapper/de-wrapper test functionality

Ethernet up to 10GigE

For testing native Ethernet interfaces 10/100/1000M and GigE and verifying real interworking with the NewGen solution. 10GigE LAN/WAN allows enhanced testing on PCS and MAC/IP layers.

MultiChannel Low Order

Analyses all 1000 channels of a 2.5 Gb/s bandwidth in 2.5 and 10 Gb/s signals. Uses multiple service disruption measurements to see all detailed effects during switching processes in SDH/SONET systems. No blind spots.



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